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power to track the regulation signal. Examples are provided in FIGS. 5-11 on how to make the distribution.

FIG. 5 is an example energy band diagram. The amount of energy of the second energy storage device is considered, as well as the direction of movement (which is related to the regulation status of the slow unit), as indicated by energy flow arrow 510. The energy bands are defined by outer bands O1, O2, and by inner bands I1, I2. Although four bands are shown, any number of bands can be used, such as 2, 3, 4, 5, etc. By way of example, at a point 512, a fast unit can be 50% charged, but in a state of discharging until it reaches point 514. At this point, as it continues to discharge, it moves below a lower threshold O1. The controller then initiates the slow unit 120 to begin assisting in charging the fast unit until it reaches a point 516. At that point, the slow unit discontinues charging, as the fast unit is within the desired range of between I1 and I2. As a second example, starting from the point 512, the fast unit can also be in a state of charging until it reaches point 520. At this point, the fast unit has exceeded an energy threshold and the controller initiates that the slow unit assists in discharging the fast unit until it reaches point 522. At that point, the controller switches the slow unit back to a neutral state.

FIGS. 6 and 7 show flow diagrams of a top-level case statement that can be used by the controller in providing the regulation service. In decision block 610, a check is made whether the energy stored in the fast unit is less than or equal to a maximum of 100%, but greater than or equal to the upper energy band threshold O2. If yes, in process block 612, the second energy storage device 122 is discharged. For example, returning to FIG. 5, the second energy storage device can move from the point 520 towards point 522. If decision block 610 is answered in the negative, a second decision block 620 is used to determine whether the energy level of the fast unit is greater than or equal to the inner energy band threshold I2. If yes, in decision block 622, a determination is made whether the slow unit is providing regulation. If not, in process block 624, a normal mode of operation is used wherein the regulation signal is tracked using the second device. Otherwise, if the slow unit is providing regulation, then the first energy device 120 assists the second energy storage device to discharge in process block 626.

If decision block 620 is answered in the negative, the flow continues at process block 710 in FIG. 7 wherein an energy level of the fast unit is checked to determine whether it is between the inner energy bands I1 and I2. If so, this is the desired energy range for the fast unit and, in process block 712, the fast unit is used to track the regulation signal, while the slow unit remains at substantially constant power output, meaning that the controller does not attempt to modify the power output of the slow unit in order to track the regulation signal. If decision block 710 is answered in the negative, then in decision block 714, an energy level of the fast unit is checked to determine whether it is less than the inner energy band threshold I1. If so, in decision block 720, a check is made to determine whether the slow unit is providing regulation. If not, then the fast unit tracks the regulation signal while the slow unit remains at a substantially constant power output (process block 722). If yes, then the slow unit assists in charging the fast unit so that tracking the regulation signal is shared between both the slow and fast units (process block 724). If decision block 714 is answered in the negative, then in decision block 730, a determination is made whether the energy is between 0% and the energy band threshold O1. If so, then the slow unit assists the fast unit to charge, so tracking the regulation signal is shared between both the slow and fast units (process block 732).

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FIG. 8 is a flowchart for determining the regulation status of the slow unit and setting the regulation flag to a proper value based on the energy level of the fast unit. The regulation flag is used in FIGS. 6 and 7 to determine whether the slow unit is providing regulation. In decision block 810, a determination is made whether an energy level of the fast unit exceeds the upper energy band threshold O2. If so, the regulation flag is set to discharge (process block 812). Otherwise, in decision block 814, a determination is made whether the energy level of the fast unit is less than the inner energy band I2. If so, a check is made in decision block 816 whether the flag is already set to discharge. If so, the regulation flag is set to neutral (process block 818). In decision block 820, a determination is made whether the energy level of the fast unit is less than the lower energy band threshold O1. If so, the regulation flag is set to charge in process block 822. If not, the flow continues to decision block 830, wherein a determination is made whether the energy level of the fast unit exceeds the lower energy threshold I1. If so, a check is made in decision block 832 whether the regulation flag is set to charge. If so the regulation flag is changed to neutral. Otherwise, an error condition is signaled.

FIG. 9 shows a flowchart of a method that can be used when the fast unit is within a desired energy range, which is considered a normal mode of operation. This flowchart can be used as a continuation of FIGS. 6 and 7 when a process block says to track regulation using the second device. In decision block 910, a determination is made whether the regulation service exceeds a maximum capacity of the fast unit. If so, in process block 912, the power from the slow unit is set to the power of the regulation service less the maximum power output of the fast unit. Additionally, in process block 914, the power output from the fast unit is set to the maximum. Alternatively, if the regulation service is less than or equal to the minimum capacity of the fast unit (decision block 920), power from the slow unit is equal to the regulation service less the minimum power output from the fast unit (process block 922). The power output of the fast unit is then set to the minimum power output value (process block 924). If decision block 920 is answered in the negative, then in process block 930, power from the fast unit is set to the regulation service and power from the slow unit is set to zero (process block 932) meaning it remains at substantially constant power.

FIG. 10 is a flowchart of a method used wherein a slow unit assists in charging the fast unit. As with FIG. 9, this flowchart can be considered an extension of FIGS. 6 and 7 when the second device is charged. In decision block 1010, a check is made whether the regulation service is less than the minimum capacity of the fast unit. If so, in process block 1012, power of the slow unit is set to the regulation service required less the minimum power of the fast unit. Additionally, in process block 1014, the power from the fast unit is set to the minimum power of the fast unit. If decision block 1010 is answered in the negative, then in decision block 1020, a check is made whether the regulation service is less than or equal to the minimum capacity of the fast unit plus the maximum regulation power capacity of the slow unit. If so, in process block 1022, power from the fast unit is set equal to the regulation service required and the slow unit remains at substantially constant output power (process block 1024). If decision block 1020 is answered in the negative, then in process block 1030, power from the fast unit is set to the regulation service less the power of the slow unit and the power of the slow unit is set to the maximum regulation power capacity of the slow unit (process block 1032).

FIG. 11 is a flowchart of a method used wherein a slow unit assists in discharging the fast unit. As with FIG. 9, this flow-